

10 GLOSSARY

Aerosol: Particulate material, other than water or ice, in the atmosphere. Aerosols are important in the atmosphere as nuclei for the condensation of water droplets and ice crystals, as participants in various chemical cycles, and as absorbers and scatterers of solar radiation, thereby influencing the radiation budget of the earth-atmosphere system, which in turn influences the climate on the surface of the Earth.

Afforestation: The process of establishing a forest on land not previously forested.

Anaerobic Fermentation: Fermentation that occurs under conditions where oxygen is not present. For example, methane emissions from landfills result from anaerobic fermentation of the land filled waste.

Anthropogenic: Of, relating to, or resulting from the influence of human beings on nature.

Atmosphere: The envelope of air surrounding the Earth and bound to it by the Earth's gravitational attraction.

Biomass: The total dry organic matter or stored energy content of living organisms that is present at a specific time in a defined unit (ecosystem, crop, etc.) of the Earth's surface.

Biosphere: The portion of Earth and its atmosphere that can support life.

Carbon Sink: A pool (reservoir) that absorbs or takes up released carbon from another part of the carbon cycle. For example, if the net exchange between the biosphere and the atmosphere is toward the atmosphere, the biosphere is the source, and the atmosphere is the sink.

Carbon Dioxide (CO₂): Carbon dioxide is an abundant greenhouse gas, accounting for about 66 percent of the total contribution in 1990 of all greenhouse gases to radiative forcing. Atmospheric concentrations have risen 25% since the beginning of the Industrial Revolution. Anthropogenic source of carbon dioxide emissions include combustion of solid, liquid, and gases fuels, (e.g., coal, oil, and natural gas, respectively), deforestation, and non-energy production processes such as cement-production.

Carbon Monoxide (CO): Carbon monoxide is an odorless, invisible gas created when carbon containing fuels are burned incompletely. Participating in various chemical reactions in the atmosphere, CO contributes to smog formation, acid rain, and the buildup of methane (CH₄). CO elevates concentrations of CH₄ and tropospheric ozone (O₃) by chemical reactions with the atmospheric constituents (i.e., the hydroxyl radical) that would otherwise assist in destroying CH₄ and O₃.

Chlorofluorocarbons (CFCs): A family of inert non-toxic and easily liquified chemicals used in refrigeration, air conditioning, packaging, and insulation or as solvents or aerosol propellants. Because they are not destroyed in the lower atmosphere, they drift into the upper atmosphere where their chlorine components destroy ozone.

Climate Change: The long-term fluctuations in temperature, precipitation, wind, and all other aspects of the Earth's climate.

Deforestation: The removal of forest stands by cutting and burning to provide land for agricultural purposes, residential or industrial building sites, roads, etc. or by harvesting trees for building materials or fuel.

Enteric Fermentation: Fermentation that occurs in the intestines. For example, methane emissions produced as part of the normal digestive processes of ruminant animals is referred to as "enteric fermentation."

Flux: Rate of substance flowing into the atmosphere (e.g. lbs/ft²/second).

Global Warming Potential (GWP): Gases can exert a radiative forcing both directly and indirectly: direct forcing occurs when the gas itself is a greenhouse gas; indirect forcing occurs when chemical transformation of the original gas produces a gas or gases which themselves are greenhouse gases. The concept of the Global Warming Potential has been developed for policymakers as a measure of the possible warming effect on the surface-troposphere system arising from the emissions of each gas relative to CO₂.

Greenhouse Effect: A popular term used to describe the roles of water vapor, carbon dioxide, and other trace gases in keeping the Earth's surface warmer than it would be otherwise.

Greenhouse gases: Those gases, such as water vapor, carbon dioxide, tropospheric ozone, nitrous oxide, and methane that are transparent to solar radiation but opaque to infrared or longwave radiation. Their action is similar to that of glass in a greenhouse.

Hydrofluorocarbons (HFCs): HFCs are substitutes for CFCs and HCFCs which are being phased-out under the *Montreal Protocol on Substances that Deplete the Ozone Layer*. HFCs may have an ozone depletion potential (ODP) of zero, however, they are very powerful greenhouse gases. For example, HFC-23 and HFC-134a have a GWPs of 10,000 and 1,200 respectively.

Methane (CH₄): Following carbon dioxide, methane is the most important greenhouse gas in terms of global contribution to radiative forcing (18 percent). Anthropogenic sources of methane include wetland rice cultivation, enteric fermentation by domestic livestock, anaerobic fermentation of organic wastes, coal mining, biomass burning, and the production, transportation, and distribution of natural gas.

Nitrous Oxide (N₂O): Nitrous oxide is responsible for about 5 percent of the total contribution in 1990 of all greenhouse gases to radiative forcing. Nitrous oxide is produced from a wide variety of biological and anthropogenic sources. Activities as diverse as the applications of nitrogen fertilizers and the consumption of fuel emit N₂O.

Nitrogen Oxides (NO_x): One form of odd-nitrogen, denoted as NO_x is defined as the sum of two species, NO and NO₂. NO_x is created in lighting, in natural fires, in fossil-fuel combustion, and in the stratosphere from N₂O. It plays an important role in the global warming process due to its G-3 contribution to the formation of ozone (O₃).

Ozone (O₃): A molecule made up of three atoms of oxygen. In the stratosphere, it occurs naturally and it provides a protective layer shielding the Earth from ultraviolet radiation and subsequent harmful health effects on humans and the environment. In the troposphere, it is a chemical oxidant and major component of photochemical smog.

Perfluorinated Carbons (PFCs): PFCs are powerful greenhouse gases that are emitted during the reduction of alumina in the primary smelting process. Eventually, PFCs are to be used as substitutes for CFCs and HCFCs. PFCs have a GWP of 5,400.

Radiative Forcing: The measure used to determine the extent to which the atmosphere is trapping heat due to emissions of greenhouse gases.

Radiatively Active Gases: Gases that absorb incoming solar radiation or outgoing infrared radiation, thus affecting the vertical temperature profile of the atmosphere. Most frequently cited as being radiatively active gases are water vapor, carbon dioxide, nitrous oxide, chlorofluorocarbons, and ozone.

Reforestation: The re-planting of a forest or timber stand, having been previously harvested or lost due to natural or man-made causes, such as fire.

Stratosphere: Region of the upper atmosphere extending from the tropopause (about 5 to 9 miles altitude) to about 30 miles.

Trace Gas: A minor constituent of the atmosphere. The most important trace gases contributing to the greenhouse effect include water vapor, carbon dioxide, ozone, methane, ammonia, nitric acid, nitrous oxide, and sulfur dioxide.

Troposphere: The inner layer of the atmosphere below about 15 km, within which there is normally a steady decrease of temperature with increasing altitude. Nearly all clouds form and weather conditions manifest themselves within this region, and its thermal structure is caused primarily by the heating of the Earth's surface by solar radiation, followed by heat transfer by turbulent mixing and convection.

Volatile Organic Compounds (VOCs): Volatile organic compounds along with nitrogen oxides are participants in atmospheric chemical and physical processes that result in the formation of ozone and other photochemical oxidants. The largest sources of reactive VOC emissions are transportation sources and industrial processes. Miscellaneous sources, primarily forest wildfires and non-industrial consumption of organic solvents, also contribute significantly to total VOC emissions.

